

KIRTLAND'S WARBLER RESEARCH NEEDS

I. Life history

A. Breeding grounds

1. Predation and disturbance

a. Nest - eggs and nestlings

- Lo (1) Cowbird
 - (a) Control levels needed for Kirtland's warbler population recovery
 - (b) Optimum trap densities
 - (c) Optimum trapping period
 - (d) Other control methods

Lo (2) Human

- (a) Effect of recorded calls
- (b) Effect of disturbance by birders and photographers
- (c) Effect of disturbance by off-road vehicles and military operations
- (d) Effect of housing developments

♀ (3) Relative importance of other species (bluejays, grackles, ground squirrels, red squirrels, snakes, ants, etc.)

- (a) Control measures
 - (1) Trapping and moving or killing
 - (2) Effect of fire
 - (3) Shooting

b. Fledglings and adults

- (1) Species involved (hawks, house cats, weasels, others)
- (2) Importance
- (3) Control measures

2. Habitat preferences

a. Nesting

- (1) Structure of overstory on occupied sites
- (2) Overstory species and diversity on occupied sites
- (3) Structure of ground cover on occupied sites
- (4) Ground cover species and diversity on occupied sites
- (5) Slope
- (6) Size and configuration of habitat type
- (7) Soil type
- (8) Comparisons with similar unoccupied habitat
- (9) Estimating historical changes in "suitable" habitat
- (10) Determining amount of "suitable" habitat needed for population goals

*In conjunction with
not other species
checklist*

Mack Park ?

Probat

low

Monitoring job

41

*In progress
Winters
& Carlson
Hi for FW*

LD
LD

LD

In progress

LD - mod

*Mark P. Study
Pop. Dynamics
1. Dispersal
2. Recolonization
3. and many related
Habitat*

*Included
these as
would be
part of Mark P.
Study*

- b. Fledgling
 - (1) Structure of overstory on sites used
 - (2) Overstory species and diversity on sites used
 - (3) Structure of ground cover on sites used
 - (4) Ground cover species and diversity on sites used
 - (5) Comparison with non-used habitats in vicinity
- 3. Weather
 - a. Effects on fledglings produced
 - b. Effects on fledgling survival
- 4. Food supplies
 - a. Kinds of insects consumed in relation to time
 - b. Effect of pesticides on food
 - c. Number of insects per unit area in various habitats occupied and unoccupied
- 5. Diseases and parasites
- 6. Range expansion
 - a. Imprinting on breeding sites
 - (1) When territories selected
 - (2) How habitat located
 - b. Cross-fostering
 - (1) Development of techniques on related species of warblers raised by various foster parents
 - (a) Transfer of eggs
 - (b) Transfer of nestlings
 - (2) Trials with Kirtland's warblers
 - c. Inventory of potential breeding habitat outside traditional range
 - (1) Michigan
 - (2) Other states and Canadian provinces
- 7. Census methodology and related
 - a. Frequency of singing
 - (1) By date and time of day
 - (2) In relation to nesting progress
 - (3) With various weather conditions
 - (4) In relation to matedness
 - b. Determination of matedness
 - (1) Males without mates
 - (2) Females without mates
 - (3) Males with two females
 - c. Identification of individual singing males
 - (1) Plumage
 - (2) Sonagrams
 - d. Use of sensitive microphones to aid in detection of song
 - e. Determining distances songs can be heard under various weather conditions, land forms, and vegetation
- 8. Nesting and nest success
 - a. How territories are selected
 - (1) Males
 - (2) Females
 - (3) Differences by age

- b. Differences in production by yearling and adult females
- c. Extent of double-broodedness
- d. Success of first nestings and second nestings
- e. Survival of first broods and second broods

Low

- B. Plumages
 - 1. Identification of sex in fledglings
 - 2. Identification of yearling plumages in both sexes

- C. Migration

- 1. Spring and fall
 - a. Timing of migration by sex and age classes
 - b. Migration routes
 - c. Whether birds fly non-stop or in steps
 - d. Whether birds fly in groups or singly
 - e. Effects of storm fronts and other weather patterns on movements
 - f. Mortality factors
 - (1) Lighted structures
 - (2) Storms
 - (3) Predation
 - (4) Pesticides
 - g. Habitat used during migration
 - h. Navigational methods
- 2. Spring - possible staging areas in Bahamas

- D. Wintering grounds

- 1. Determination of wintering areas
 - a. Using tape recorded calls in Bahamas
 - b. Following radio-equipped birds from Florida
 - c. Other methods
- 2. Habitats occupied
 - a. Location and extent of such habitat
 - b. Disturbance by human activities
 - c. Habitat changes, natural and man-caused
 - d. Management possibilities
 - e. Need for refuges
- 3. Food supplies
 - a. Insects
 - b. Other foods
- 4. Mortality factors
 - a. Predation
 - b. Food shortages
 - (1) Drought
 - (2) Competition with other birds
 - (a) Other Kirtland's warblers
 - (b) Other species
 - c. Storms, hurricanes and thunderstorms
- 5. Sociability
 - a. Do birds winter alone or in groups
 - b. Other associates
 - c. Are they territorial?

P. Committed

- E. Population modeling
 - 1. Development of a predictive model using a variety of population, habitat, and weather parameters
 - 2. Determining optimum management strategies using model
 - 3. Obtaining weather data directly from Bahamas

II.

Habitat regeneration on breeding grounds

A. Creating preferred jack pine habitat

- 1. Regeneration by fire
 - (a) Compare success of stands which have been regenerated with and without fire
 - (1) Overstory
 - (2) Ground vegetation
 - (b) Investigate how to achieve proper fire characteristics for optimum seed production with prescribed burns
 - (1) Surface versus crown fires
 - (2) Season of burn
 - (3) Intensity
 - (4) Ground moisture conditions
 - (c) Determine optimum number and placement of seed trees
 - (d) Determine role of slash in seed production following regular cutting cycle
- Planting
 - (a) Site preparation needed
 - (1) Cutting methods, clearcut vs. shelterwood for shade and wind control
 - (2) Need for fire for ground preparation
 - (3) Value of roller chopper for ground preparation
 - (4) Other scarification and weed control techniques
 - (5) Slash disposal methods
 - (b) Evaluate various sizes and configurations of blocks
 - (1) Optimum spacing of blocks from each other
 - (2) Optimum block size
 - (3) Optimum configuration of plantings
 - i. Standing wave
 - ii. Other
 - iii. Tree density - spacing
 - (c) Type of planting material used
 - (1) Compare various genetic stocks
 - (2) Compare success of seeds versus seedlings
 - (3) Evaluate age of seedlings on costs and survival
 - (4) Develop optimum cultural methods for seedlings
 - (5) Determine value of using seedling containers
 - (6) Conduct trials of pelleted seeds

*Hi priority
Jack pine pil. X
various intensity
of burn and
no burn.*

*Needs to be developed
in conjunction with
Bennett - DNR - W
Botti - DNR - Forestry
Dart - MSU - Forestry?
& H-MNF + DNR*

*Develop
Mgt. people and
Problem statement
sent to NCFES
to Jack pine
to NCFES to give priority*

- (d) Developing efficient planting methods
 - (1) Determine optimum tree spacings for regular block plantings
 - (2) Study of Inter-planting and spot replacement techniques
 - (3) Develop efficient machine and hand planting equipment
 - (4) Develop optimum packing, shipping, and handling procedures for seedlings
 - (5) Evaluate direct seeding methodology
 - (6) Compare costs of various methods
- 3. Management of habitat created by wild fires
 - (a) Determine need for spot seeding
 - (b) Determine need for interplanting
 - (c) Determine positive and negative effects of dead tree removal
 - (1) Firewood sales
 - (2) Commercial removal of standing trees
 - (d) Determine need for coppice control on deciduous trees
 - (e) Determine need for development of natural firebreaks
- 4. Develop information system to store detailed records on successfully and unsuccessfully regenerated stands, both natural and artificial
 - (a) Historical
 - (1) Obtain and examine available information on older regenerated stands
 - (2) Measure relative success of these efforts
 - (b) Recent
 - (1) Record all pertinent data prior to and during regeneration process
 - (2) Carry out periodic examinations of stands
 - (c) Conduct analyses of data
- 5. Develop management guidelines which consider various combinations of:
 - (a) Site indices
 - (b) Water table levels
 - (c) Slopes
 - (d) Other tree and shrub species
 - (e) Soils
 - (f) Markets
- B. Protection of habitat
 - 1. Insects and disease
 - (a) Determine species involved and probable effects
 - (1) Anomala beetle
 - (2) White pine weevil
 - (3) Sawflies
 - (4) Budworms
 - (5) Grubs
 - (6) Others

- (b) Develop control methods
 - (1) Role of fire prior to regeneration
 - (2) Pesticides
 - (3) Natural predators - thatch ant, others
 - (4) Other
- 2. Wildfires
 - (a) Develop better methods of stopping wildfires
 - (b) Develop ways of monitoring weather changes prior to and during prescribed burns
 - (c) Develop natural firebreaks in management areas
- C. Marketing jack pine
 - 1. Find markets for burned standing trees
 - 2. Develop steady markets for 50-year-old trees
 - 3. Investigate markets for "young" trees
 - 4. Prepare benefit-cost ratios of various management strategies
- D. Study of alternate tree species
 - 1. Try other conifer species to see if they will grow successfully on Grayling sand
 - (a) Lodgepole pine
 - (b) Scotch pine
 - (c) Other species
 - 2. Prepare experimental plantations of proper size and configuration
 - (a) Study growth and economic considerations
 - (b) Observe use by Kirtland's warblers

III. Jack pine ecosystem

- A. Prepare detailed inventories of all plant and animal species present in jack pine stands in relation to the age, density and composition
 - 1. Measure animal species changes over time
 - 2. Measure plant species changes over time
- B. Monitor the effects of Kirtland's warbler management on the abundance of other species
 - 1. Animals
 - 2. Plants

LAR:mh
7/84